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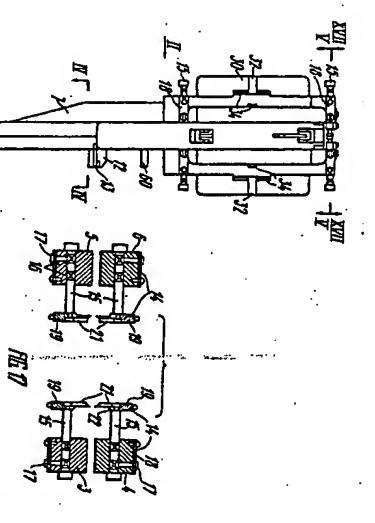
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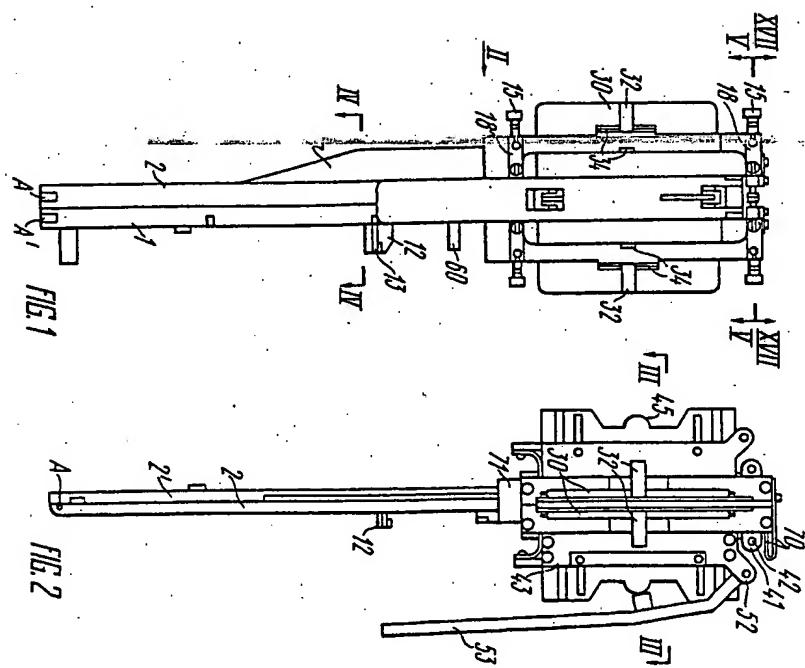
(21) Application No 6131877 (54) Device for applying anastomoses
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(57) A device for applying anastomoses onto hollow organs comprises two substantially similar parts provided with means for their coupling and each one of said parts includes two pivotally connected handles 1, 2. Each handle carries at the free end thereof flat plates 3, 4, 5, 6, the pair of these plates defining a flat clamp when the handles are brought together. The device further incorporates magazines 6a with needles 45 and dies 24 for bending the staples. The device is provided with means for shifting tissue along the axis thereof as a torus or cushion is formed. This means includes a comb-like plate 19 with sharp points 28 provided on the plate projections, a slot 34 arranged on the inner side of the comb-like portion and engaging each projection and partially the comb proper; an adjustable support 15 carrying the comb-like plate for its travel in the plane parallel to the axis of the flat clamp, as well as retaining members 17 adapted to position adjustable support depending on the position of the comb-like plate. Used as dies 24 are needle-like dies.



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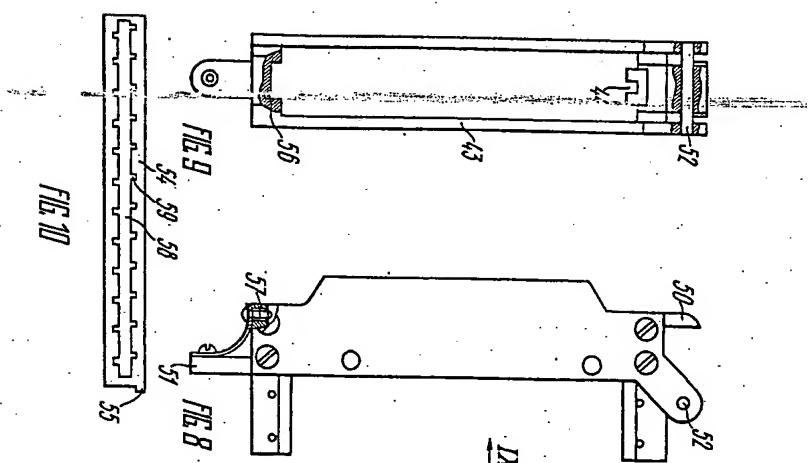
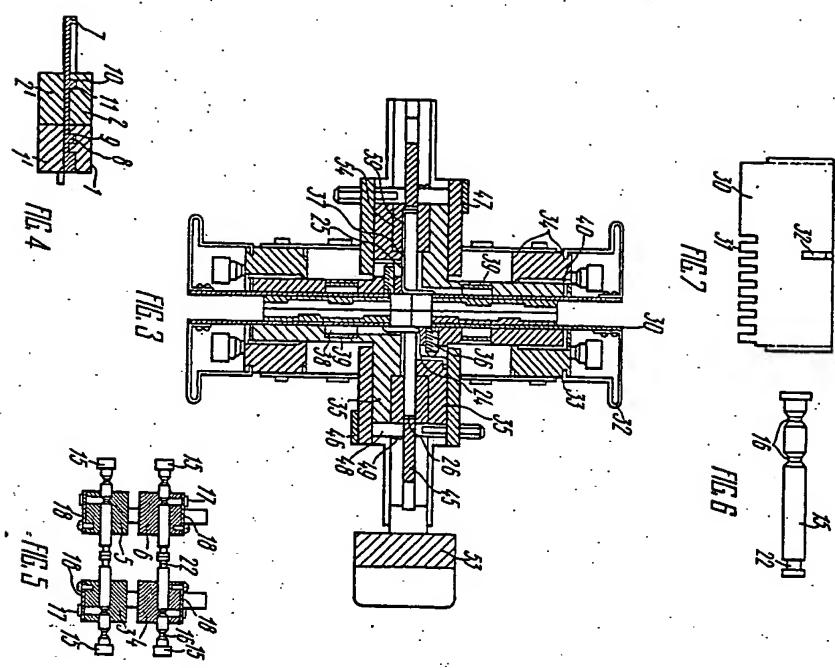


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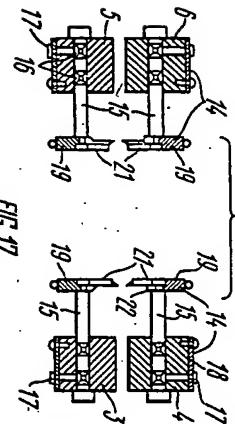


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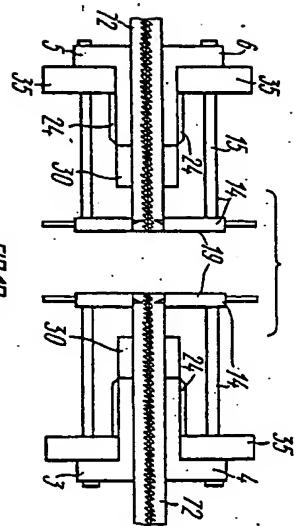
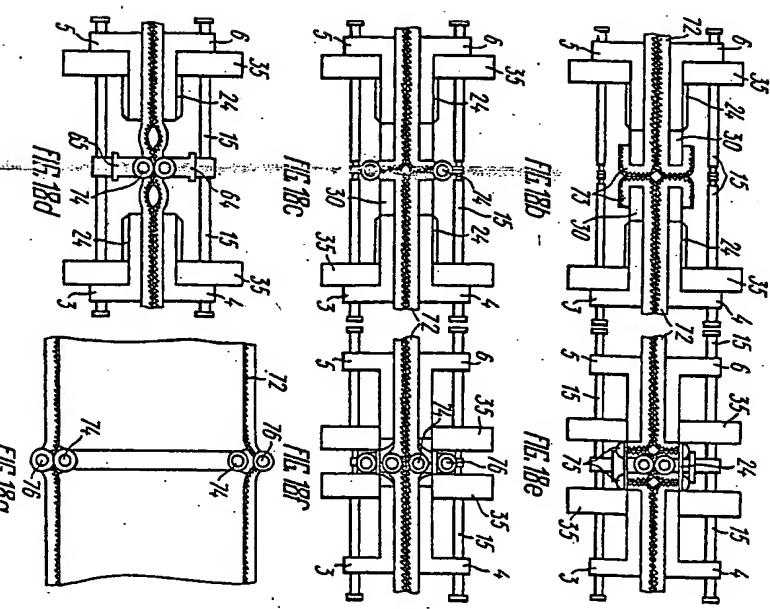


FIG. 18a



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FIG. 189

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SPECIFICATION

Device for applying anastomoses onto hollow organs

The present invention relates to medical instruments, and more particularly it relates to surgical suturing devices, such as devices for applying anastomoses onto hollow organs, e.g. the organs of the digestive tract, for instance, for joining intestines in the end-to-end, end-to-side or side-to-side manner, with either single- or two-layered buried sutures, without introducing the working parts of the device into the lumen of the organ being sutured.

The present invention has for its aim to provide a construction of the suturing part of the device, which should enable to select the optimized length portions of the organ to be sutured without taking the device off the organ, and to suture the walls exclusively through the serous-muscular layer.

When applying single- or double-layered sutures, this aim is attained in a device for applying anastomoses into hollow organs comprising two substantially similar parts, provided with means for their coupling at suturing, each one of these parts including two pivotally connected handles, each handle carrying at the free end thereof a flat plate, the pair of these plates defining a flat clamp.

Removable magazine with grooves, bushes and disk for bending the staples or sutures, mounted on the outer surfaces of the flat plates, which device, in accordance with the invention, each clamp is provided with means for shifting layers of the intestine edge easily as a comb or cushion is formed, the means including a plate having a comb-like edge which the longitudinal axis thereof passes along the connection plane of the coupled parts and adapted to travel only perpendicularly to the longitudinal axis of the connection plane, sharp points provided on the projection of the comb proper, adjustable support carrying the comb-like plate and the flat plate forming the clamp, retaining members of the adjustable support adapted to fix them in a required position depending on the position of the comb-like plate after its travel parallel to the axis of the flat clamps, whereas used as a comb-like die, which die is movably mounted on the plane of flat plates forming the clamp.

It is expedient that each clamp should be provided with a removable plate with grooves, movably mounted intermeshed to the plane of the specific die, and the outer plane of the flat plate of the clamp, for displacement relative to the edges of this plate.

It is further expedient that the adjustable supports adapted to travel in the plane of the axis of the flat clamp be in form of grooves with grooves engageable by the spring-like retaining means.

According to one embodiment of the invention, the flat plate defining the clamp has enlarged

portions with grooves serving as guides for the displacement of the die and of the plate with the grooves.

Owing to the disclosed structure of the suturing part of the device, the precise optimization, forming the first and second level of the sutures, irrespectively of the personal experience of the surgeon, thus positively ensuring the minimized reduction of the lumen of the anastomosis; the suturing would be conducted without compressing exclusively the tissue of the organ along the line of the suture; it is possible to apply double-layered sutures without shifting the device; when buried sutures are made, it is ensured that the tissue is sutured exclusively through the serous-muscular layer.

The invention will be further described in connection with embodiments thereof, with reference being made to the accompanying drawings, wherein:

FIG. 1 is a general view in plan of a device embodying the invention;

FIG. 2 is a view taken along arrow II in FIG. 1, in accordance with the invention;

FIG. 3 is a sectional view taken on line V-V of FIG. 2;

FIG. 4 is a sectional view taken on line IV-IV of FIG. 1;

FIG. 5 is a sectional view taken on line V-V of FIG. 6;

FIG. 6 shows the support in the form of a grooved rod;

FIG. 7 shows the movable plate;

FIG. 8 shows the housing adapted to accommodate the staple magazine (i.e. the magazine holder);

FIG. 9 is a view taken along arrow IX in FIG. 8;

FIG. 10 shows the staple magazine;

FIG. 11 shows the clamp for applying double-layered sutures;

FIG. 12 is a view taken along arrow XII in FIG. 11;

FIG. 13 is a sectional view taken on line XIII-XIII in FIG. 11;

FIG. 14 shows the removable movable plate with the groove;

FIG. 15 is a view taken along arrow XV in FIG. 14;

FIG. 16 is a sectional view taken on line XVI-XVI in FIG. 14;

FIG. 17 is a sectional view taken on line XVII-XVII in FIG. 1, with the comb-like plates mounted in the supports;

FIG. 18 illustrates the routine of applying a double-layered suture;

FIG. 18a — same as FIG. 18, with the first suture applied to the ends of the intestines to be sutured;

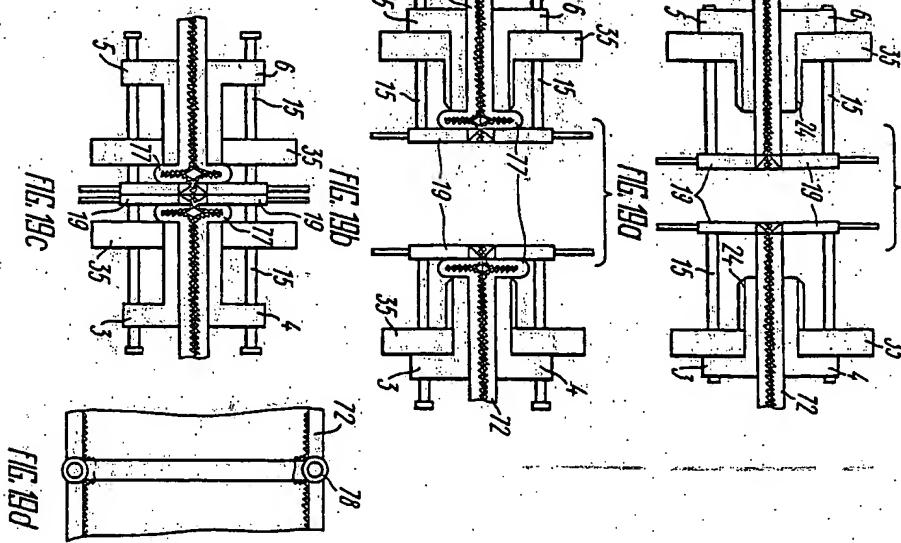
FIG. 18b — same as FIG. 18, with the ends of the intestines to be sutured prepared on the extended removable grooved plates;

FIG. 18c — same as FIG. 18, with the first suture level made; the grooved plates are tractioned inward;

FIG. 18d — same as FIG. 18, with the die are pressed;

FIG. 18e — same as FIG. 18, with the clamp applied to the first suture level, to apply a double-layered buried suture;

FIG. 18f — same as FIG. 18, with the handles moved closer together to form cushions of the walls



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nesting the combs-like plates with the flat plates of the clamp, retaining members of the adjustable support adapted to fix it in a required position depending on the position of the comb-like plates after the travel thereof parallel to the axis of the flat clamp, wherein used as such, die is a needle-like die, which die is mounted with the provision to travel in the plane of flat plates defining the flat clamp.

2. A device according to claim 1 wherein each groove is provided with a removable plates with the need-like die and the outer surface of the flat plate of the clamp, for displacement relative to the edges of this plate.

3. A device of claim 1, wherein the adjustable supports adapted to travel in the plane of the axis of the flat clamp are made as rods with grooves engageable by spring-tipped retaining means.

4. A device of claim 1, wherein the flat plate defining the clamp has enlarged portions with grooves acting as guide ways for the motion of the dies and the groove plate.

5. A device for applying anastomoses on hollow organs, substantially as hereinbefore described and illustrated in the appended drawings.

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